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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/475,104 | 12/30/1999 | NAGESH VODRAHALLI | 042390.P6785 | 5963 |

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| EXAMINER |
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MITCHELL, JAMES M

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| ART UNIT | PAPER NUMBER |
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2813

DATE MAILED: 09/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action SummaryApplication No. **09/475,104**Applicant(s)
VODRAHALLI ET AL.

Examiner

James M. Mitchell

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 5-13 and 15-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 5-13 and 15-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This office action is in response to the request for continued examination filed June 7, 2004.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 5-13, 15-18, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mertol (U.S. 5,909,056) in combination with Iannacone (U.S. 4,975,142), Fillion et al. (US 6,306,680), Jow (...Microwave Curing of Epoxy...) and Jeng (U.S. 5,789,270)
2. Mertol discloses (cl. 5,18) a method for assembling an integrated circuit package, comprising: applying a thermal epoxy (302) to a top surface of an integrated circuit (311) and contains carbon particles (via thermal epoxy; per applicant's admission, APP. CLM 14 & 15 filed 09/27/ 2001), placing a thermal element (301) adjacent to the thermal epoxy; and applying an encapsulant (310) over the integrated circuit, the thermal element and the thermal thermal epoxy; (cl. 6,10) mounting the integrated circuit to a substrate (306); (cl. 7,11) further attaching solder ball (307) to the substrate; (cl. 8, 12) wherein the applying of the encapsulant comprises molding the encapsulant onto the substrate and the integrated circuit (i.e. epoxy shaped by being filled/fitted into ring and

therefore molded); Col. 4, Lines 9-13); (cl. 13) wherein the thermal element is a heat spreader (300); (cl 16) the placing of the thermal element includes attaching thermal element (300) to epoxy (302);

3. Mertol does not appear to show that the epoxy has filler or curing the thermal epoxy with energy at a microwave frequency, such that the selected frequency will cure without damaging an IC or the sequence of bonding the heat sink and encapsulating.

4. However, Iannacone teaches epoxy filled with conductive fillers (Col. 3, Lines 22-23).

It would have been obvious to one of ordinary skill in the art to incorporate fillers into the epoxy of Mertol in order to provide a thermally conductive epoxy as required by Iannacone (Col. 3, Lines 22-23)

Fillion (Col. 4, Lines 62-66) and Jow utilize a microwave frequency to cure epoxy via an inherent microwave generator selecting a frequency to cure epoxy without damaging IC (via Jow patent presumed valid; i.e. operational), wherein the microwave generator directed toward the epoxy (via epoxy is cured).

5. It would have been obvious to one of ordinary skill in the art to utilize energy at a microwave frequency with the epoxy of Mertol, in order to harden the epoxy as taught by Fillion (Col. 4, Lines 62-66) to further secure the thermal element to the device and to decrease fabrication time by providing faster cure as taught by Jow (P. 465, Bottom Right Column).

6. Jeng teaches curing and bonding a heat sink to a chip prior to curing a chip encapsulation.

7. It would have been obvious to one of ordinary skill in the art to cure the adhesive prior to encapsulation to provide a maximum strength bond as taught by Jeng (Col. 5, Lines 18-31)

8. Alternatively, while there does not appear to be an express teaching that the encapsulant is applied after curing of the epoxy, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed sequence because applicant has not disclosed that the limitation is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical. Moreover, it is well established that, in a well known process, the order of performing process steps is prima facie obvious in the absence of new or unexpected results. Ex parte Rubin 128 USPQ (PO BdPatApp 1959).

9. Claims 19, 21, 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mertol (U.S. 5,909,056), Iannacone (U.S. 4,975,142), Fillion et al. (US 6,306,680), Jow (...Microwave Curing of Epoxy...) and Jeng (U.S. 5,789,270 in combination with AGEN (JP62-36091).

10. Mertol, Iannacone, Fillion, Jow and Jeng disclose the elements of paragraphs 2-8 of this office action, but do not appear to disclose baking the substrate into/onto which the IC is to be mounted.

11. AGEN teaches baking the substrate into/onto, which the IC is to be mounted (Title).

12. It would have been obvious to one of ordinary skill in the art to incorporate baking the substrate of Mertol which the IC is to be mounted, in order form metallization of the substrate as taught by AGEN (Title) and required by Mertol (i.e. "traces"; Col. 3, Lines 64-66).

Response to Arguments


13. Pursuant to applicant's filing of a 37 CFR 1.131 declaration, applicant's arguments have been fully considered and are persuasive. Therefore, the previous rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Mertol (U.S. 5,909,056), *supra*.

Conclusion


14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Mitchell whose telephone number is (571) 272-1931. The examiner can normally be reached on M-F 10:30-8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jmm
August 20, 2004



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